Algebra 2 Honors
Exponential & Logarithmic Functions Final Exam Review

Name: _____
Date: _____

Simplify:

1) $x^4y^3 \cdot (2y^2)$

$2x^4y^5$

2) $(2y^2)^{-3} \cdot 2yx^3$

$\frac{2yx^3}{8y^6} = \frac{x^3}{4y^5}$

3) $\frac{(x^{-3})^4x^4}{2x^{-3}}$

$\frac{x^4 \cdot x^3}{2x^{12}} \rightarrow \frac{x^7}{2x^{12}} = \frac{1}{2x^5}$

4) $\frac{(2x^3z^2)^{-3}}{x^3y^4z^2x^{-4}z^3} \rightarrow \frac{x^4}{x^3y^4z^5 8x^9z^6} \rightarrow \frac{x^4}{8x^{12}y^4z^{11}} \rightarrow \frac{1}{8x^8y^4z^{11}}$

Another data point on this graph is (-3, 20).

Write a function to match this situation.

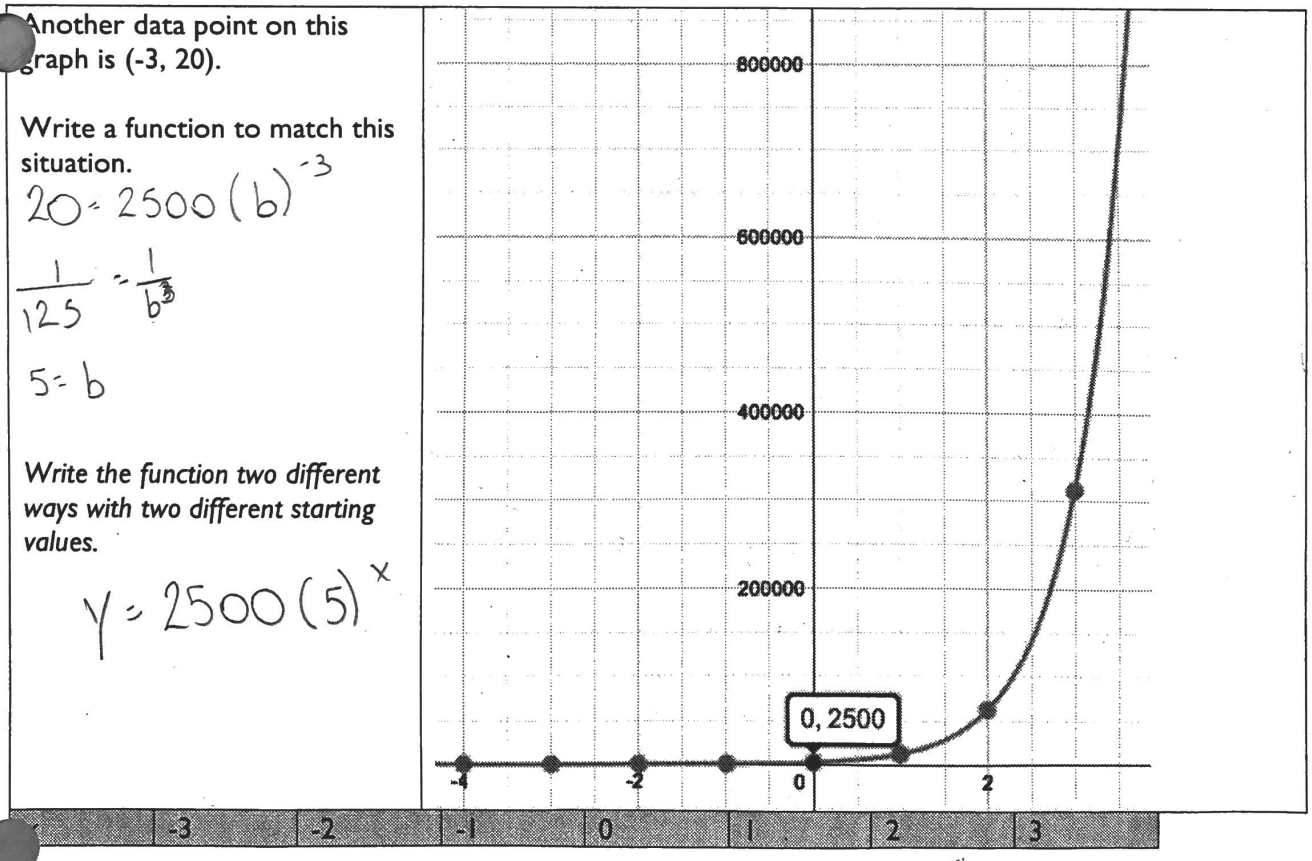
$20 = 2500(b)^{-3}$

$\frac{1}{125} = \frac{1}{b^3}$

$5 = b$

Write the function two different ways with two different starting values.

$y = 2500(5)^x$



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	-3	-2	-1	0	1	2	3
y	$\frac{27}{2}$	9	6	4	$\frac{8}{3}$	$\frac{16}{9}$	$\frac{32}{27}$

5) $ab^4 = \frac{16}{9}$

$b^4 = \frac{16}{81}$

$b = \frac{2}{3}$

$y = 4\left(\frac{2}{3}\right)^x$

X	-4	-3	-2	-1	0	1	2	3	4
y			12	6	3	$\frac{3}{2}$	$\frac{3}{4}$	$\frac{3}{8}$	$\frac{3}{16}$

6) $12 \cdot b^6 = \frac{3}{16}$

$b^6 = \frac{3}{192}$

$b^6 = \frac{1}{64}$

$b = \frac{1}{2}$

16
×12
32
16

$a = 3$

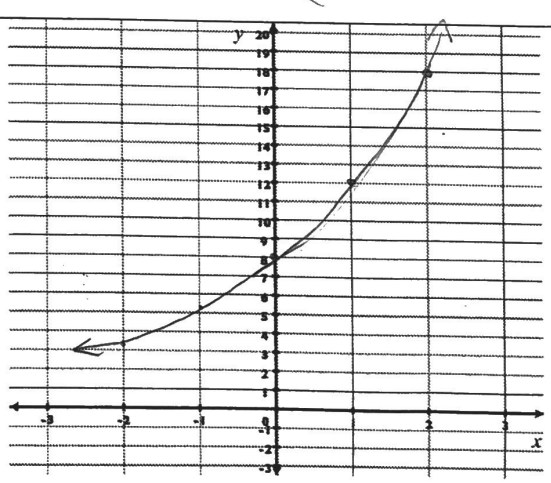
$y = 3\left(\frac{1}{2}\right)^x$

7) A ball reaches a height of 80 inches after one bounce and a height of 12.8 inches on a later bounce. From what height was it dropped?

8)

$f(x) = 8\left(\frac{3}{2}\right)^x$

x	y
-2	$3\frac{1}{3}$
-1	$5\frac{1}{3}$
0	8
1	12
2	18



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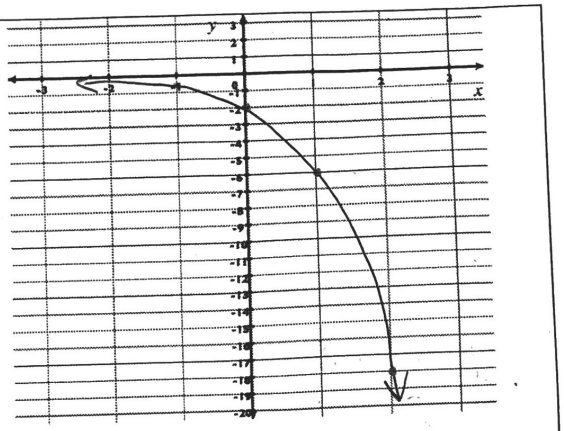
9) $f(x) = -2(3)^x$

x	y
-2	$-\frac{2}{9}$
-1	$-\frac{2}{3}$
0	-2
1	-6
2	-18



10) Let $f(x) = 3 \cdot 4^x$. Use the law of exponents to explain why each of the following equations is true.

a. $16f(x) = f(x+2)$

$16(3 \cdot 4)^x = 3 \cdot 4^{x+2}$

$48 \cdot 4^x = 3 \cdot 4^x \cdot 4^2$

$48 \cdot 4^x = 48 \cdot 4^x$

$4^x = 4^x$

b. $\frac{f(x)}{4} = f(x-1)$

$\frac{3 \cdot 4^x}{4} = 3(4)^{x-1}$

$\frac{3 \cdot 4^x}{4} = 3(4)^x \cdot 4^{-1}$

$\frac{3 \cdot 4^x}{4} = \frac{3(4)^x}{4}$

11) Using the laws of exponents to solve for A: $6 \cdot 4^{x+2} = A \cdot 4^x$

$6 \cdot 4^x \cdot 4^2 = A \cdot 4^x$

$96 \cdot 4^x = A \cdot 4^x$

$96 = A$

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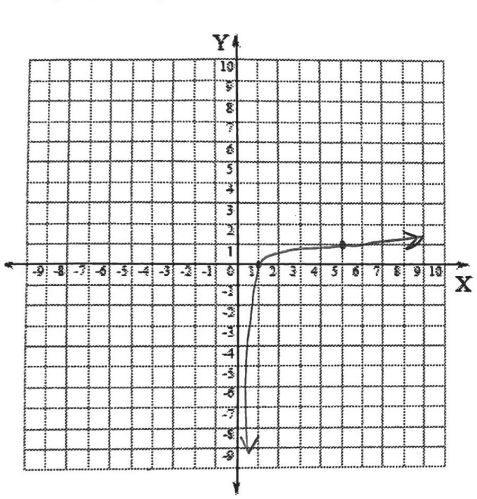
12) Start with $y = 7^{x-3}$ and rewrite the equation in the form $y = a(b^x)$.

$y = 7^x \cdot 7^{-3}$

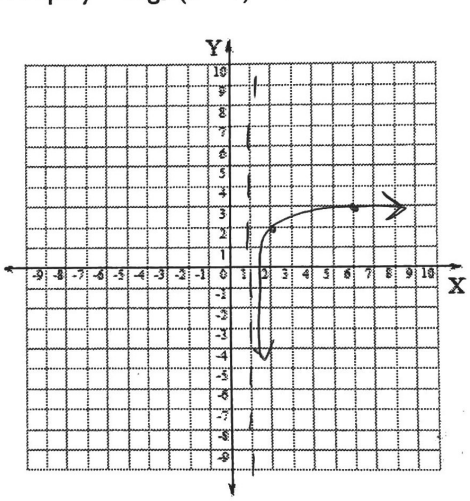
$y = 7^x \cdot \frac{1}{343}$

$y = \frac{1}{343}(7)^x$

13) Graph $y = \log_5 x$



Graph $y = \log_5 (x - 1) + 2$



14) Each log equation can be rewritten as an exponential equation, and vice versa. Rewrite each equation below in the other form.

a. $y = 7^x$

$\log_7 y = x$

b. $\log_4 x = y$

$4^y = x$

c. $11^y = x$

$\log_{11} x = y$

d. $W^k = B$

$\log_w B = k$

e. $K = \log_w B$

$W^K = B$

f. $\log_{\frac{1}{3}} P = Q$

$\left(\frac{1}{3}\right)^Q = P$

15) Rewrite each expression:

a) $\log_2 8 - \log_2 4$

$\log_2 \frac{8}{4}$

$\log_2 2$

$\boxed{1}$

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b) $3 \log_b x + \log_b y$

$\log_b x^3 y$

c) $\log_5 2 + \log_5 6$

$\log_5 12$

d) $3 \log_b 4 - 3 \log_b 2$

$\log_b \frac{4^3}{2^3}$

$\boxed{\log_b 8}$

e) $\log_3 20 - \log_3 4$

$\boxed{\log_3 5}$

f) $3 \log_2 x + \log_2 y$

$\boxed{\log_2 x^3 y}$

g) $3 \log 2 + \log 4 - \log 16$

$\log \frac{8 \cdot 4}{16}$

$\boxed{\log 2}$

h) $\log_4 64 - \log_4 16$

$\log_4 4$

$\boxed{\log 1}$

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16) Solve:

a. $6^{2x} = 21$

$2x \log 6 = \log 21$

$2x = \frac{\log 21}{\log 6}$

$x = 0.8495$

b. $3^{x+4} = 101$

$(x+4)\log 3 = \log 101$

$x + 4 = \log_3 101$

$x = 0.19$

c. $9^{2y} = 66$

$2y \log 9 = \log 66$

$y = 0.9534$

d. $8 + 10^x = 1008$

$10^x = 1000$

$x = 3$

e. Use the Change of Base Formula to evaluate $\log_3 15$

$\frac{\log 15}{\log 3} = 2.465$

f. $\log(2x - 2) = 4$

$10^4 = 2x - 2$

$5001 = x$

g. $\log 2x + \log x = 11$

$\log 2x^2 = 11$

$10^{11} = 2x^2$

$x = 223606.7978$

h. $3 \log x - \log 6 + \log 2.4 = 9$

$\log \frac{x^3}{6}\left(\frac{2.4}{1}\right) = 9$ → $\log \frac{2.4x^3}{6} = 9$

$10^9 = \frac{2.4x^3}{6}$ → $1{,}000{,}000{,}000 = \frac{2.4x^3}{6}$

$6{,}000{,}000{,}000 = 2.4x^3$

$25{,}000{,}000{,}000 = x^3$

$x = 1357.21$

17) Use the Change of Base Formula to evaluate $\log_3 15$

$\frac{\log 15}{\log 3} = 2.465$

18) Evaluate $\log_6 12$ and convert it to a logarithm in base 3.

$\frac{\log 12}{\log 6} = 1.3869$

$3^{1.38685} = 4.58878$

$\log_6 12 = \log_3 4.58878$